

creates a dialog to solicit and provide information as a function of which controls are activated.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIG. 1 is a plan view of a first embodiment of a computing device operating environment.

[0012] FIG. 2 is a block diagram of the computing device of FIG. 1.

[0013] FIG. 3 is a block diagram of a general purpose computer.

[0014] FIG. 4 is a block diagram of an architecture for a client/server system.

[0015] FIG. 5 is a display for obtaining credit card information.

[0016] FIG. 6 is an exemplary page of mark-up language executable on a client having a display and voice recognition capabilities.

[0017] FIGS. 7 is a block diagram illustrating a first approach for providing recognition and audible prompting in client side markups.

[0018] FIG. 8 is a block diagram illustrating a second approach for providing recognition and audible prompting in client side markups.

[0019] FIG. 9 is a block diagram illustrating a third approach for providing recognition and audible prompting in client side markups.

[0020] FIG. 10 is a block diagram illustrating companion controls.

[0021] FIG. 11 is a detailed block diagram illustrating companion controls.

DETAILED DESCRIPTION OF THE ILLUSTRATIVE EMBODIMENTS

[0022] Before describing architecture of web based recognition and methods for implementing the same, it may be useful to describe generally computing devices that can function in the architecture. Referring now to FIG. 1, an exemplary form of a data management device (PIM, PDA or the like) is illustrated at 30. However, it is contemplated that the present invention can also be practiced using other computing devices discussed below, and in particular, those computing devices having limited surface areas for input buttons or the like. For example, phones and/or data management devices will also benefit from the present invention. Such devices will have an enhanced utility compared to existing portable personal information management devices and other portable electronic devices, and the functions and compact size of such devices will more likely encourage the user to carry the device at all times. Accordingly, it is not intended that the scope of the architecture herein described be limited by the disclosure of an exemplary data management or PIM device, phone or computer herein illustrated.

[0023] An exemplary form of a data management mobile device 30 is illustrated in FIG. 1. The mobile device 30 includes a housing 32 and has a user interface including a display 34, which uses a contact sensitive display screen in conjunction with a stylus 33. The stylus 33 is used to press or contact the display 34 at designated coordinates to select

a field, to selectively move a starting position of a cursor, or to otherwise provide command information such as through gestures or handwriting. Alternatively, or in addition, one or more buttons 35 can be included on the device 30 for navigation. In addition, other input mechanisms such as rotatable wheels, rollers or the like can also be provided. However, it should be noted that the invention is not intended to be limited by these forms of input mechanisms. For instance, another form of input can include a visual input such as through computer vision.

[0024] Referring now to FIG. 2, a block diagram illustrates the functional components comprising the mobile device 30. A central processing unit (CPU) 50 implements the software control functions. CPU 50 is coupled to display 34 so that text and graphic icons generated in accordance with the controlling software appear on the display 34. A speaker 43 can be coupled to CPU 50 typically with a digital-to-analog converter 59 to provide an audible output. Data that is downloaded or entered by the user into the mobile device 30 is stored in a non-volatile read/write random access memory store 54 bi-directionally coupled to the CPU 50. Random access memory (RAM) 54 provides volatile storage for instructions that are executed by CPU 50, and storage for temporary data, such as register values. Default values for configuration options and other variables are stored in a read only memory (ROM) 58. ROM 58 can also be used to store the operating system software for the device that controls the basic functionality of the mobile 30 and other operating system kernel functions (e.g., the loading of software components into RAM 54).

[0025] RAM 54 also serves as a storage for the code in the manner analogous to the function of a hard drive on a PC that is used to store application programs. It should be noted that although non-volatile memory is used for storing the code, it alternatively can be stored in volatile memory that is not used for execution of the code.

[0026] Wireless signals can be transmitted/received by the mobile device through a wireless transceiver 52, which is coupled to CPU 50. An optional communication interface 60 can also be provided for downloading data directly from a computer (e.g., desktop computer), or from a wired network, if desired. Accordingly, interface 60 can comprise various forms of communication devices, for example, an infrared link, modem, a network card, or the like.

[0027] Mobile device 30 includes a microphone 29, and analog-to-digital (A/D) converter 37, and an optional recognition program (speech, DTMF, handwriting, gesture or computer vision) stored in store 54. By way of example, in response to audible information, instructions or commands from a user of device 30, microphone 29 provides speech signals, which are digitized by A/D converter 37. The speech recognition program can perform normalization and/or feature extraction functions on the digitized speech signals to obtain intermediate speech recognition results. Using wireless transceiver 52 or communication interface 60, speech data is transmitted to a remote recognition server 204 discussed below and illustrated in the architecture of FIG. 5. Recognition results are then returned to mobile device 30 for rendering (e.g. visual and/or audible) thereon, and eventual transmission to a web server 202 (FIG. 5), wherein the web server 202 and mobile device 30 operate in a client/server relationship. Similar processing can be used for other forms